

T73S02 Tutorial Session #18 (J Testing) – Homework

Mentor Guide K&S Questions:-

- 3.1 Describe how the fracture toughness of a brittle material could be measured in principle. Explain why this methodology would not be applicable for a ductile material.
- 3.2 Describe the methodologies for toughness testing of ductile steels, including both the multi-specimen and single specimen techniques. Describe what is measured and how the initiation toughness is obtained.
- 3.3 Explain what is meant by “stable tearing” and how the tearing modulus is measured.
- 3.4 Explain what is meant by the “validity” of a fracture toughness measurement, and state the validity criteria for ductile (J) tests. Explain the theoretical basis for these limits in terms of the crack tip fields. For typical pressure vessel steels and standard toughness specimen sizes, what is the typical limit on the valid extent of stable crack growth?
- 3.5 Describe how the fracture toughness of ferritic steels vary with temperature, giving typical values.
- 3.6 Describe the effects of environment and loading rate (e.g. dynamic loading) on the fracture toughness.
- 3.7 Describe the effect of neutron irradiation on fracture toughness, and for which materials this may be more significant.

And also...in lieu of a numerical question...

Arrange a visit to Barnwood 100 to witness a toughness test being carried out and see how the data is recorded and interpreted.