

MC112 Materials and Design for High Temperatures

Day 1

- Part I: Structural materials and damage in elevated and high temperature applications
 - Examples for plants and components operating at high temperature
 - How can strength be obtained and maintained at high temperatures?
 - Classes of high temperature materials (steels, superalloys, Al,Cu,Ti-based materials)
 - Production technologies
 - Creep and fatigue as challenge for design/damage assessments of components
 - Data scatter and extrapolation of long-term creep and stress-rupture data
 - Isochronous stress-strain curves
 - Creep damage and fatigue damage and how can they interact.
 - Subcritical crack growth under creep and fatigue

Day 2

- Part II: Design and life-time assessments of components exposed to high temperatures
 - Multi-axiality and creep damage and fatigue damage.
 - Problems with reliable data generation and interpretation
 - Influence of cyclic hardening/softening
 - Crack growth under creep-fatigue loading
 - Design stresses, Design by rule/Design by analysis
 - Structural discontinuities and cyclic loads
 - Shake-down, ratchetting and buckling
 - The linear life fraction rule (and its limitations)
 - Advanced life-time assessment methods (and limitations)
 - Strain control/creep-fatigue analysis
 - Fitness for Service considerations