



Hot Deformation Processing Map and Microstructural Evaluation of the Ni-Based Superalloy IN-738LC

S.A. Sajjadi, A. Chaichi, H.R. Ezatpour, A. Maghsoudlou, and M.A. Kalaie

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Hot deformation behavior of the Ni-based superalloy IN-738LC was investigated by means of hot compression tests over the temperature range of 1000-1200 °C and strain rate range of 0.01-1 s⁻¹. The obtained peak flow stresses were related to strain rate and temperature through the hyperbolic sine equation with activation energy of 950 kJ/mol. Dynamic material model was used to obtain the processing map of IN-738LC. Analysis of the microstructure was carried out in order to study each domain's characteristic represented by the processing map. The results showed that dynamic recrystallization occurs in the temperature range of 1150-1200 °C and strain rate of 0.1 s⁻¹ with the maximum power dissipation efficiency of 35%. The unstable domain was exhibited in the temperature range of 1000-1200 °C and strain rate of 1 s⁻¹ on the occurrence of severe deformation bands and grain boundary cracking.