

Title (en)

Method of controlling and refining final grain size in supersolus heat treated nickel-base superalloys

Title (de)

Verfahren zur Steuerung der Endkorngröße bei supersoluswärmebehandelten Legierungen auf Nickelbasis

Title (fr)

Procédé de contrôle et d'affinement de la grosseur de grain finale dans des superalliages à base de nickel traité par traitement thermique intermédiaire

Publication

EP 2295612 A1 20110316 (EN)

Application

EP 10167751 A 20100629

Priority

US 49489609 A 20090630

Abstract (en)

A gamma prime precipitation-strengthened nickel-base superalloy and method of forging an article (10) from the superalloy to promote a low cycle fatigue resistance and high temperature dwell behavior of the article (10). The superalloy has a composition of, by weight, 16.0-22.4% cobalt, 6.6-14.3% chromium, 2.6-4.8% aluminum, 2.4-4.6% titanium, 1.4-3.5% tantalum, 0.9-3.0% niobium, 1.9-4.0% tungsten, 1.9-3.9% molybdenum, 0.0-2.5% rhenium, greater than 0.05% carbon, at least 0.1% hafnium, 0.02-0.10% boron, 0.03-0.10% zirconium, the balance nickel and incidental impurities. A billet is formed of the superalloy and worked at a temperature below the gamma prime solvus temperature of the superalloy so as to form a worked article (10), which is then heat treated above the gamma prime solvus temperature of the superalloy to uniformly coarsen the grains of the article (10), after which the article (10) is cooled to reprecipitate gamma prime. The article (10) has an average grain size of not coarser than ASTM 7 and is substantially free of critical grain growth.

IPC 8 full level

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CPC (source: EP US)

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Citation (applicant)

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Citation (search report)

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- [Y] US 6521175 B1 20030218 - MOURER DAVID P [US], et al
- [Y] US 4957567 A 19900918 - KRUEGER DANIEL D [US], et al
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