

EFFECT OF VARIOUS TEMPERATURE DROPPING CONDITIONS DURING SOLUTION TREATMENT IN REFURBISHMENT HEAT TREATMENT ON FINAL MICROSTRUCTURES OF CAST NICKEL BASE SUPERALLOY, GRADE INCONEL 738

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Abstract

Generally, the refurbishment of degraded turbine blades by reheat treatment processes, which the blades are made of cast nickel based superalloy, grade Inconel 738, usually consist of solution treatment with one or two steps of precipitation aging. Solutioning treatment with temperature range of 1125°C- 1205°C for 3 hours was selected to carry out in this study and then following with double aging processes, which include primary aging at 1055°C for 1 hour and secondary aging at 845°C for 24 hours. To simulate the effect of the possible change of temperature during solution treatment such as the temperature dropping down, which can be sometimes obtained by error or malfunction of heating furnace, the dropping temperature level during solution treatment was chosen to decrease till the level of 845°C in various conditions, which usually happens in practices then immediately being heated up again to selected solution temperature level. The various selected temperature dropping time programs were performed during solution treatment. The maximum number of temperature droppings during the single solution treatment is up to 4 times. From the received results, it was found that the effect of temperature dropping during solution treatment has extremely influenced on the final refurbished microstructures.

Keywords: Nickel base superalloy, refurbishment, Inconel 738, temperature dropping, solution treatment

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