

NASA TECH BRIEF



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Heat Treatment Procedure to Increase Ductility of Degraded Nickel Alloy

A study has been conducted to establish a heat treatment procedure that will increase the room temperature ductility of degraded René 41 (a nickel base alloy) in the form of thick plate and forgings. Tests have shown that the room temperature ductility of degraded hardware and out-of-specification mill stock of René 41 can be increased to acceptable values by solution heat treatment of the material at a temperature of 2050° to 2150° F (1 to 2 hours) and cooling through a controlled temperature range followed by normal aging in air (16 hours at 1400° F). Elongation (a measure of ductility) of test specimens of rejected forgings tested at room temperature was increased from the original 4 percent to approximately 13 percent. (Specification grade René 41 from commercial sources has an elongation of 15 to 20 percent.) After this heat treatment, the alloy can be subjected to additional heat treatment by conventional procedures without appreciable decrease in ductility.

Although the feasibility of this procedure has been established for a number of specimens, several prob-

lem areas remain to be investigated. These include weldability, effects on cold-worked material, types of damage for which the procedure is effective, effect on elevated temperature properties, effect of carbon content of alloy, and impact properties.

Note:

Inquiries concerning this procedure may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B68-10029

Patent status:

No patent action is contemplated by NASA.

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