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Copper/Nickel Eutectic Brazing of Titanium

Titanium or one of its alloys can be joined to another material, such as iron, nickel, or cobalt base material and even to a refractory metal by use of diffusion-brazing techniques and a copper/nickel to titanium eutectic.

The basic concept behind this approach is that if an eutectic can be formed between two pieces of titanium and a thin film of an interlayer material, then another material can be substituted for one of the pieces of titanium, and the eutectic will still be formed through agency of the remaining titanium member.

The film of joining material may be commercially pure copper or nickel, or an alloy containing up to 3% foreign elements such as Cr, Mn, Al, Sn, Si, etc. It may be a Cu/Ni alloy such as Monel, Constantan, or an alloy containing up to 8% foreign elements as in "R-, K-, H-, or S-Monel." Film thickness may vary from 1×10^{-3} to 80×10^{-3} mm. Its placement may involve the use of various techniques such as chemical plating, electroplating, vapor deposition, or metallizing; also any form of shims or foils may be preplaced.

In order to ensure a satisfactory bond, temperature, time, environment, and pressure must be controlled. The technique has been used to join 17-7 PH, 17-4 PH and René 41 to Ti-6Al-4V using 13×10^{-3} mm copper as the interlayer material.

Note:

Requests for further information may be directed to:

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Reference: TSP71-10525

Patent status:

No patent action is contemplated by NASA.

Source: Richard E. Kutchera of
General Electric Co.
under contract to
Ames Research Center
(ARC-10337)

Category 08