METHODS FOR TREATING SUPERALLOY ARTICLES, AND RELATED REPAIR PROCESSES

ABSTRACT

A method is described, for treating a superalloy substrate (32) which includes at least one cavity (33) containing adherent metal oxide material on its surface (31). A short-pulsed, high repetition rate laser beam (46) is directed against the cavity surface for a period of time sufficient to remove substantially all of the adherent metal oxide material. The laser beam (46) is characterized by a peak power density in the range of about 10 megawatts/cm^2 to about 10 gigawatts/cm^2. In another embodiment, a high-power, short-pulsed, high repetition rate laser beam is directed to a region (62) on the substrate (64) which includes the cavity (60), under laser operational conditions which are capable of cutting into the superalloy material; so that a boundary region (66) is formed within the substrate, which encloses the cavity. The cavity can be a crack in a turbine blade, and the crack (60) can be repaired after treatment, by welding, or by another suitable technique.

Figure 2