

LASER SHOCK PEENING INTEGRALLY BLADED

ROTOR BLADE EDGES

ABSTRACT

A method for laser shock peening rotor blade (108) leading and trailing edges (LE, TE) of gas turbine engine integrally bladed rotors and disks that are not blocked by other rows of blades. The method includes continuously firing a stationary laser beam (102), which repeatable pulses between relatively constant periods, along at least a portion of leading or trailing edges (LE, TE) of the blade (108), with the laser beam (102) aimed at an oblique angle (110) with respect to a surface of the edge such that laser pulses form overlapping elliptical shaped laser spots (60). In the exemplary embodiment of the invention, the elliptical shaped laser spots (60) have an overlap of about 50% and are on the order of 11.7 mm by 4 mm in diameter. Another method is for laser shock peening rotor blade leading and trailing edges (LE, TE) of gas turbine engine integrally bladed rotors and disks that are blocked by other rows of blades. The method includes continuously firing the stationary laser beam (102), which repeatable pulses between relatively constant periods, along at least a portion of leading or trailing edges (LE, TE) of the blade (108), with the laser beam (102) compoundly angled such that it is aimed at a first oblique angle (110) with respect to a surface of the edge and at a second oblique angle (114) with respect to an axis about which the rotor is circumscribed. Laser pulses form the elliptical shaped laser spots (60) that are angled from the leading edge (LE) radially inwardly towards the axis. In the exemplary embodiment, the elliptical shaped laser spots (60) have an overlap of about 50%.

Figure 1