Heat-Affected Zone of Plasma of Laser Cut Materials

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Permanent evolution of new high-strength and difficult-to-machine materials as well as production of precise and shaped products have made the engineering practice to advance towards development of technologies to allow such materials to be machined without major difficulties. In such cases, advanced machining technologies are gaining ground whose principle is based on application of physical, or combined physical and mechanical methods of forceless material removal rather than mechanical work such as conventional cutting operations. In most cases, such methods involve conversion of the energy supplied to heat which, more or less, affects the base material being machined. The most frequent technologies of this kind include machining by cutting using a plasma beam or a laser beam. The plasma beam machining and laser beam machining are both based on melting the material at extremely high temperatures. Such extremely high temperatures cause formation on an area in the base material where the structure of the material is changed by the heat down to various depths. The objective of the experiments described in this paper is to determine the size of the heat-affected zone and to identify the changes in the structure of selected types of material and their effects on further machining.

Keywords: plasma cutting, laser cutting, heat-affected zone, structure of base material

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