Enhancement of Mechanical properties of Copper Brazed Joint by Laser Surface Modification

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Abstract: Nowadays, laser surface modification (LSM) has become the most advance technique for improving the surface properties for joining methods. This is due to its advantages such as cleaner, precise, more reliable and provides exact control compare to other surface modification techniques. This technique also applicable on wide range of materials, such as metal/alloy, ceramic and polymer. Brazing is a metal-joining process in which two or more metal items are joint together by melting and flowing a filler metal into the joint, the filler metal having a lower melting point than the base materials. The brazing process performed under a controlled atmosphere in vacuum tube furnace. Microscopic observations were made by use of both optical and electron microscopes. Fibre laser surface modification-brazing of 2 mm thick 99% pure copper plate in the lap joint configuration performing with Cu-based filler metal. There are three microgrooves were produce with three different laser power apply 15 watt, 21 watt and 27 watt. It found that successful brazing and wetting can be achieved by modified the surface for the base metal. The result of shear tensile test indicated that the highest shear strength achieved in groove by using 27. This is because of its excellent of its excellent spreading behaviour of molten filler metal, largest bonding interface area and suitable intermetallic compound (IMC) distribution.

Keywords: Laser Surface Modification; Brazing; Vacuum Brazing; Microgroove; IMC
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