

EFFICIENT BRAZING WITH MICROWAVES

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Since metals are generally good reflectors of microwaves, only indirect methods have been used to heat them with microwaves. Traditional methods involve use of some ceramics (e.g., alumina etc.) as susceptors that have better coupling with microwaves. The absorption of microwaves in such materials is due to the complex value of the dielectric constant. The loss tangent is usually quite small at room temperature but goes up with the rise of temperature. As a result, the heating of metals by this method is quite slow and, consequently, highly inefficient.

We have recently developed a simple method of using microwaves (e.g., 2.45 GHz at ~ 1 KW) to create plasma in a suitable gas at atmospheric pressure. The plasma surrounds the part and heats it rapidly. In a multimode applicator we can dump about 90-95% of the microwave energy into the plasma and, as a result, a very fast and efficient heating of metals can be achieved. Some recent results of brazing steel joints with copper, as well as aluminum joints will be presented.