Abstract

This research studies and simulates the temperature distribution in the spot welding joints using tungsten arc welding protected with inert gas (TIG Spot) for the aluminum alloy type (5052-O) .The effect of time, current of welding and arc length on temperature distribution and the quantity of the heat that enter the welding zone has been investigated. Using the finite element method and the computer programme (ANSYS 5.4) has been used to simulate the temperature distribution and the thermal stresses in spot welding. The depth of welding through two sheets.

A three dimensional (3-D) model has been constructed to find out the temperature distribution and the depth of penetration of the welding spot. The stress distribution across the diameter and across the depth of spot welding has been also studied. The temperature distribution through the spot fusion zone has also presented.

A computer educational program was accomplished depending on the method of (Dick & Cary) which contains nine stages beginning with the stage of general goal, and then ending with summative evaluation.

The educational level of the beneficiary group, before and after application of the program is measured by using (pre-test) and (post-test) to find out the efficiency of this program. Two questioners have been prepared in order to have the views of experts and the beneficiary.

This study has achieved the following results:

- The diameter of the spot welding and welded depth increase with the increase in the time and current of welding keeping arc length constant; this leads to an increase in temperature distribution with the diameter and depth of welding.

- Temperature distribution of the (3-D)models increases with the increase in the arc due to length heat dissipation over a huge area resulting in irregularities in the spot weld . Therefore, the melting metal does not penetration the metal.
- The welding area and (HAZ) suffer from temperature variation caused by, strong heat cycle (heating-cooling). The temperature reaches the highest value of the melt at the spot welding $(697.825)^{0}C$ at weld current 130 Amp, time 6 sec, Arc length 1.6 mm, then drops further away from the spot weld in the direction the base metal.
- This programme can be used without need for assistance; the educational design programme can be used in preparing other reeducational programmes in the field of mechanical engineering.