

# Behaviour of the electric arc for different times and for different values of welding currents

**S.Benharat, A.Boutaghane**

**Abstract :** Welding is a permanent joining process used to join different materials like metals, alloys or plastics, together at their contacting surfaces by application of heat and or pressure. The study of welding processes currently appears as an area of research both open and complex because it requires to share of knowledge in different fields of physics and mechanics. Thus, the description of one of the most commonly used processes, the arc welding, involves physical phenomena as varied as the study of plasmas, magnetic and hydrodynamic interactions, the description and quantification of heat transfer, etc. The aim of our work is the treatment of the influence of welding time and welding current on the form of the arc, voltage and current density in the GTWA process. For this, we realize a numerical study to determine the arc forms, the voltage and the current density, in which we use the finite element method for the calculation, using Comsol software. The Main results obtained are: 1-The arc shape and evolution of isothermal change with increasing weld time. 2-The distribution of the voltage and the current density between the torch and the plate weld obtained by simulation are the same with the results presented in the literature.

**Keywords :** arc welding, GTAW process, welding current, modeling, Finite elements method, COMSOL Multiphysics