Most of welding suites is manufactured to protect the workers from burns, however, this equipment doesn’t have a technical characteristics related to thermal comfort (Thermal Equilibrium), and flexibility (Rigid and separate elements of protection), normally they are very heavy, which generates a greater energy expenditure, fatigue and discomfort. Therefore, the aim of this study was to design an integral thermal suit for welding operators, which evaluate the characteristic mentioned.

Six welding operators have participated to this study, they underwent to test of temperature, using measurement tools, like thermocouples, a thermal camera and a heat stress meter, to verify and determine the heat exchange that the operators was submitted. Using the heat balance equation and the predicted mean vote (PMV) was calculated to know the level comfort that the operators present. With a heart rate monitor, the heart rate was measured to obtain the energy expenditure. To concept the idea and find the better design of this product, design thinking and TRIZ method were used to concept the idea. The last method includes a conflict matrix, which compared all kind of criteria necessary to elaborate the suit. Thus the tests of fire protection and traction of the proposed materials, met which are the better materials for the established areas of design suit.

The most body areas and points exposed was the neck with a temperature of 31,9 °C in area and 32.87°C in point, and the left wrist with a temperature of 33,3°C in area and 31,72°C in point. By comparing the temperature state before started welding work and after, this increases of temperature of 2,9°C. According to the results, it was possible to design a one-piece suit that generates thermal comfort and convenience, reinforcing the most exposed areas and generating flexibility. We recommend using the welding suit, as it generates comfort to the welding operator and review the suit materials to improve the relationship between human and suit.