6.1 Resistance Spot Welding

In the spot welding process, two or three overlapped or stacked stamped components are welded together as a result of the heat created by electrical resistance. This is provided by the work pieces as they are held together under pressure between two electrodes. Spot welding may be performed manually, robotically, or by a dedicated spot welding machine and may take between 0.75 and 1.5 seconds per weld.

Spot welds are discrete weld locations that look like small circles on the assembled components. They are not continuous, linear welds. Low volume components are usually done manually, whereas high volumes can be achieved best by using robots or dedicated weld equipment.

Some of the weld variables are difficult to control and may cause weld problems. Others are easy to control, such as the Current, Time and Gun Force. Achieving good weld quality starts with a good process design that minimizes the variables encountered in welding.

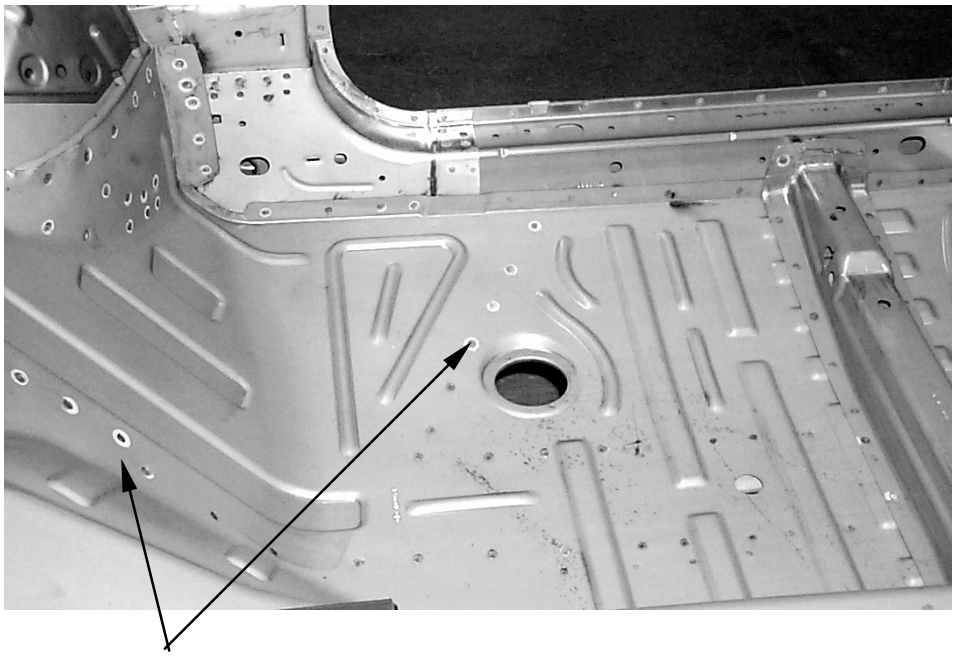

Figure 6-1. Spot Welds

6.2 Basic Welding Circuit

Welding loops are simple electrical circuits. Voltage, current, and electrical resistance can be related by a mathematical formula.

The relationship between these three characteristics of a welding circuit is shown by Ohm's Law equation:

E = IR

where,

E is the applied voltage in volts.
I is the current flowing in the circuit in amperes.
R is the total resistance of the circuit in ohms.

▸ Volt (Voltage) – the "force" that causes electrons to move in a circuit is measured in volts.

▸ Ampere (Current) – or Amp, is the rate at which current (electrons) flow in a circuit, also known as "Coulombs per second".

▸ Ohm (Resistance) – electrical resistance that impedes current is measured in ohms.