



Resistance Seam Weld Configurations

INTRODUCTION:

Resistance seam welding is a simple process that uses one or two wheels to apply pressure to the surface of two or more layers of conductive material. As the wheels roll, electric energy is applied using a capacitive discharge, high frequency, or line frequency weld controller in precise amounts to form a joint between the faying surfaces of the material.

The resistance seam weld process is a fast, reliable and low cost way to join many materials. Like most joining methods, it competes with other technologies like laser and TIG welding. This article explores the joint types and the common configurations to used form seam welds on small scale parts.

RESISTANCE SEAM WELD TYPES:

Whether the seam weld is longitudinal, circular, or a unique planar contour, the weld nugget is formed in one of three ways:

- a) Roll spot
- b) Overlapping spot
- c) Continuous seam

The roll spot type occurs when there are distinct separations between the nuggets as the roller walks across the surface. If the weld schedule is fired at a constant repetition rate, the cross-section result looks like that shown in Figure 1(a).

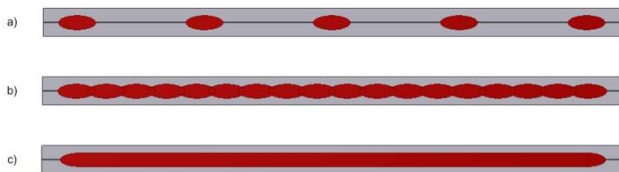


Figure 1 – Seam Weld Types. a) Roll spot b) Overlap spot c) Continuous seam

Obviously, if one maintains the linear velocity, but increases the firing rate, the spots will get closer and

closer together until they overlap. This is called overlap spot welding and creates a hermetic (i.e. leak tight) joint between the materials as depicted in Figure 1(b). The overlap spot weld technique is very effective at joining thin materials (i.e. < 0.015" thick) without burn through. Continuous seam welding occurs when a constant stream of energy is applied to the rollers. This results in a joint like that in Figure 1(c). Regardless of the type used, the electrodes are not opened between spots which results in a high speed joining process.

Typical linear velocities for small scale resistance seam welding range from 0.2 to 1.0 in/sec and depend on the material type, part thickness, and weld schedule (one or two pulse) used. The roller forces usually range from 5 to 75 lbs for thin materials, about 5 to 10 times that for a comparable pointed spot weld electrode using the same material thickness. The higher force is due to the additional surface area of the roller when compared to a straight electrode tip.

EXTERNAL LONGITUDINAL WELD:

The external longitudinal (i.e. lengthwise) weld uses the conventional seam welder configuration, with an upper and lower roller. Usually both rollers are driven at the same rotational velocity, but in opposite directions, as the material is fed between them. This configuration is often used to create a hermetic joint for small tanks or vessels and joining cylindrical filter elements.

Figure 2 shows the RSX26 seam welder configured for joining a rectangular vessel. Note, even though the part has rounded seams, the operator can easily rotate the part around the corners.

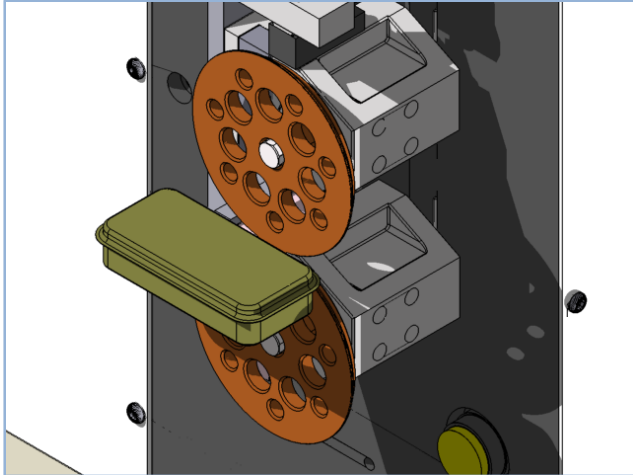


Figure 2 – External Resistance Seam Weld Configuration

INTERNAL LONGITUDINAL WELD:

Another common use of the RSX26 resistance seam welder is to perform an internal lengthwise weld on a seam or edge that's within the part. Fabricating tin cans and attaching fins to micro heat exchanger tubes are common examples.

In this case, the machine is configured with a single upper roller, while the lower roller is replaced by a linear slide. Attached to the slide, is a support bracket and conductive rail. Figure 3 provides an example of this configuration for joining a cylindrical seam.

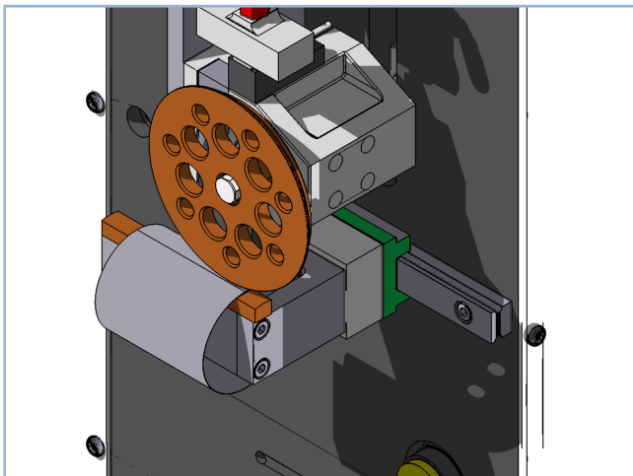


Figure 3 – Internal Resistance Seam Weld Configuration

In practice, the sheet metal would be formed to the desired cylindrical radius and the operator would use the

RSX26 machine in “spot weld” mode to place a couple of spots to secure the tube to the proper diameter. Then, the operator would switch to “seam weld” mode and run the roller over the entire length. For relatively short lengths, the tube is supported by a cantilever attached to a single slide; for longer lengths, the tube is supported by a swing arm and two slides.

CIRCULAR SEAM WELD:

The last configuration we'll look at is that for performing circular seam welds. One example is adding a band on a fine mesh filter. Again, this uses upper and lower rollers, which may have different diameters to accommodate the inside diameter of the tube. Figure 4 illustrates this configuration.

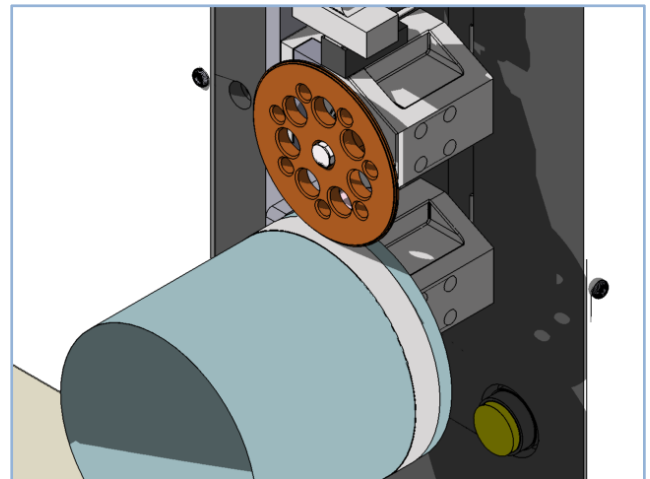


Figure 4 – Circular Seam Weld

CONCLUSION:

As one can see, a micro resistance seam welder is a flexible machine that is well suited to fabricating various small scale components. It offers a cost effective and high throughput joining method that often provides a reliable alternative to TIG and laser welding. Please contact techMatrix to take advantage of our free applications lab and engineering assistance regarding your next seam weld project.



techMatrix, LLC

St. Paul, MN 55108

www.techMatrixLLC.net

Phone: 612-605-8312