SPB-4 Effect of Electrode Geometry on Sheet Sticking for Aluminum Resistance Spot Welding

by Miranda Marcus, Elizabeth Hammond, and Richard L. Sloboda

Guidelines previously established for aluminum resistance spot welding have not addressed the problem of electrode sticking. Reducing the electrode sticking will reduce the frequency of tip dressing that is required and thereby increase electrode life. Electrode sticking during resistance spot welding has historically been much more frequent when joining aluminum than when bonding steel. Therefore, reducing electrode sticking in aluminum resistance welding will make this process more comparable to resistance welding of steel. It is important to the aluminum industry that process parameters be established in order to make the welding of aluminum more controllable and easier to use in the manufacturing industry.

Research was used to create a database analyzing which electrode geometry exhibited the least amount of sticking without compromising performance. The first step was to design and implement a method for measuring electrode sticking. Next, welds were made with each set of electrodes and the sticking forces recorded. Since electrode sticking is usually only a problem within the first 250 welds, no more than 250 repetitions were done for each electrode. The two electrode sets that exhibited the best and worst sticking characteristics were analyzed more extensively. Lastly, the collected data was used to analyze which electrode geometry resulted in the least electrode sticking.

All experimentation was done by team members Miranda Marcus, Rich Sloboda, and Liz Hammond; all graduating seniors in the Welding Engineering program at the Ohio State University. Work was conducted using the 100 KVA resistance welding machine available at the Edison Joining Technology Institute. In summation, this research established that the dome tip electrode demonstrated consistently the least amount of electrode sticking without compromising performance.