Micro

Case Study: THE MICRO WIRE BRUSH & CONTACT TECHNOLOGY

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Introduction

With low amperage potentiometric devices which use sliding or rotating contacts to control an analog signal, performance is maximized by having the most independent contact points moving across the resistive element. In applications such as Fuel Level Sensors, Pedal Sensors and Throttle Sensors, shock and vibration conditions are prevalent. This causes contact resistance to rise and this resistance be eliminated by increasing the amount of contact points.

Contacts used in such applications are normally .003" to .004" thick and produced from either base or precious coiled metal material.

Michael Tucci,
CEO and President

The approach

To resolve the related issues Micro Innovation Engineers considered the idea of using wires attached at their base whilst being free at their tips. This would allow for independent contact points when traversing the resistive element. Consequently for a .060" wide element, using .003" diameter wire, it would yield 20 independent contact points in lieu of 10 used in the stamping process.

The challenges we overcame

The challenge was in obtaining the most contact fingers, or points. This was limited to how narrow a slot can be achieved in the stamping process. Normal Stamping practice Industry Standards for a .003" inch thick material is for the slot to be .006" wide.

Advancing stamping technology, Micro was able to consistently provide .003" thick stampings with .003" wide slots. But even this capability limited the number of contact points. For example a .060" wide element would yield a maximum of 10 independent contact points.

To overcome this issue, Micro invented a lancing process using a scissor cut in lieu of stamped slots. This eliminated the space and provided contacts with double the amount of fingers, or contact points. However, this process proved to be costly, and presented quality issues with finger independence.

Resistance welding was the process of choice. In the initial stages of the development suppliers of this equipment advised it would be impossible to develop a satisfactory weld schedule to insure wire attachment, without disintegrating the wire.

Undaunted by this advice our Innovation Team spent months working with different resistance welding equipment to develop welding schedules and achieve success. Overall it was well over a year before a welding technique was perfected to achieve the objective of guaranteed wire attachment. To insure the process was consistent and repeatable, Micro's Quality Staff developed test procedures including a pull off force test to ensure strength and an enduring product life cycle.

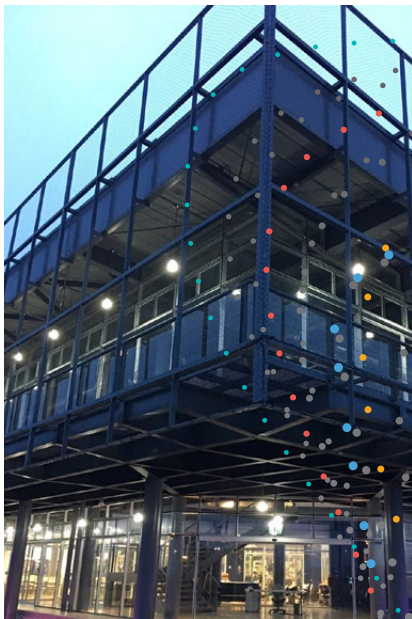
The first generation product saw Micro supply individual wire brush parts to our customers who assembled them in plastic housings. The Second and Third Generation product followed and consisted of coiled stamped strip with wires attached at the ends of the solid metal arms. This reduced the amount of wire required, and thereby radically reduced the cost of precious metal wire contacts needed for Automotive applications to satisfy multi-million life cycle requirements.

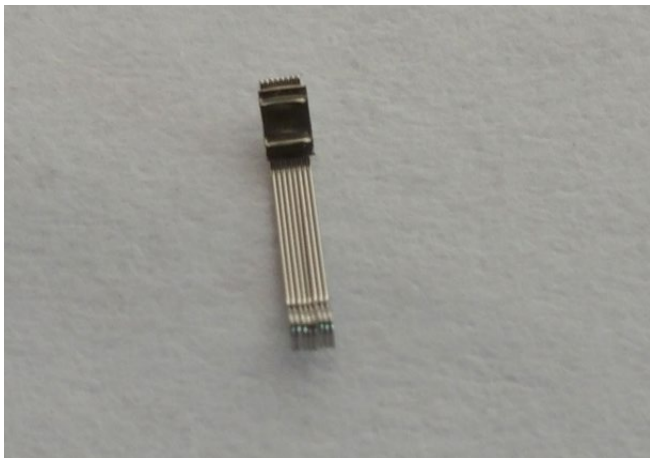
The Second and Third generation product also allowed for cost effective assembly into the plastic housing, and for the complete assembly to be supplied by Micro.

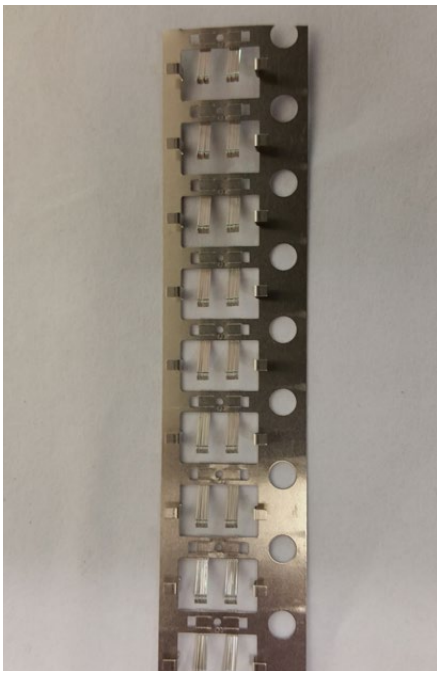
The outcome

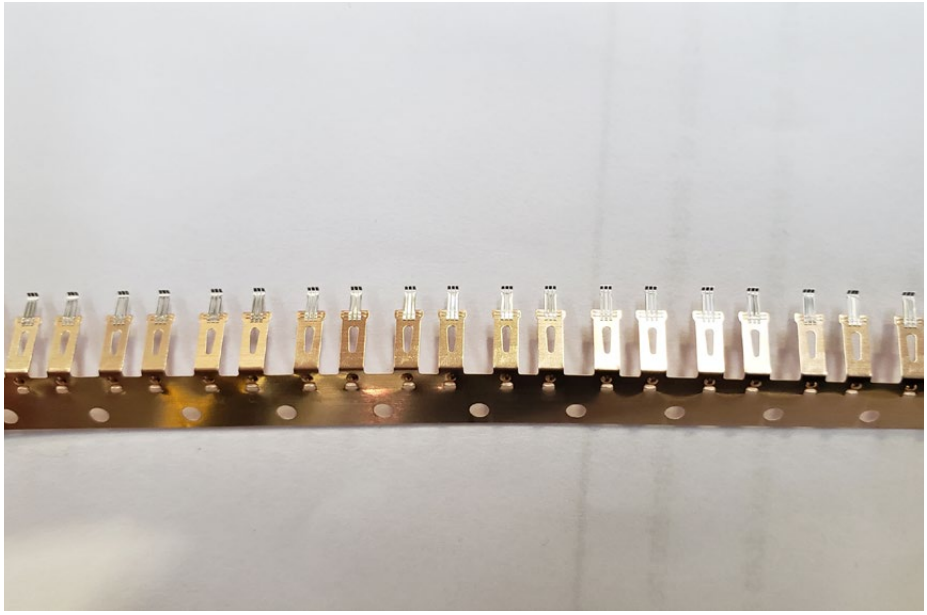
Since the implementation of the First Generation wire brush product and the full development of Third Generation wire brushes, Micro has become the worldwide recognized Leader in supplying Wire Brush Contact Assemblies.

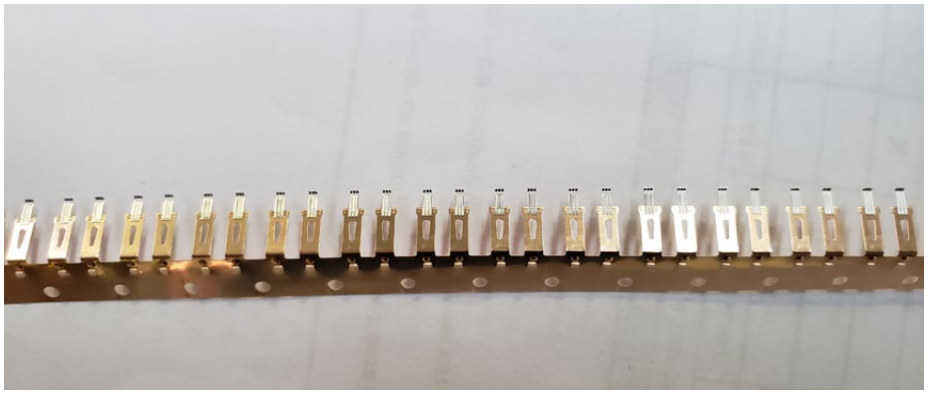
Currently Micro supplies millions units worldwide, and is expected to significantly increase supply with the expansion of Contact Technology in the Asian market.











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