Members' Profiles

# Nippon Avionics Co., Ltd.

## 1. Company Profile

Since 1963, Nippon Avionics has been assisting customers through the development of resistance welders primarily for use with electronic parts, and such joining technologies as microsoldering, thermocompression, and bonding. In 1966 the company adopted parallel seam sealing as a highly reliable hermitic sealing method for optical devices and hybrid integrated circuits. The applications for this parallel seam sealing technology expanded with the surface mounting of crystal oscillators and SAW filters in the early 1980s. When vacuum seals became necessary for the miniaturization of crystal oscillators around 2003, we quickly introduced a vacuum seam welder that is still the primary sealing method today. Recently there has been an increase in the use of seam sealing for MEMS devices, such as accelerometers, gyroscopes, and infrared sensors and our sales of seam welders has reached more than 800 units.

## 2. Parallel Seam Sealing

The principle of parallel seam sealing is to supply electricity to a lid, a seal ring, or a metal package, thereby applying Joule heating to melt a brazing filler material preset between the lid and the package. The melted filler material fills the gaps and forms a mechanical bond between the lid and the package.

As shown in **Fig. 1**, tapered roller electrodes are provided on the left and right edges of a device so as to apply a moderate load to the device. As the device is moved at a constant speed, a welding current flows intermittently between the electrodes, generating heat to melt the filler material around the lid.

Since parallel seam sealing can produce a high temperature instantaneously, the seal can be formed with nickel, which is very reliable but has a high melting point. Nickel also has a very high cooling rate, producing a dense filler composition when solidified and, thus, a high bonding strength. Further, parallel seam sealing uses localized heating and, therefore, generates only a small heat-affected zone. Accordingly, this technique can produce a hollow structure that is strong and reliable.

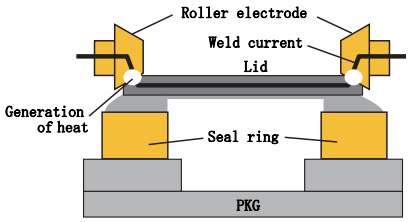


**Fig.1 Principle of seam sealing**

## 3. Sealing Product Lineup

As a specialist in welding, Nippon Avionics explored the most suitable control technologies for seam sealing and developed a dedicated power supply to install in its sealing equipment. The company has manufactured sophisticated, high-performance equipment using its own software, and mechanical, image-recognition, and application technologies and has held the top market share since its product lineup was first introduced.

We have a wide array of products ranging from manually operated units for research or low-volume production to automated inline units for mass production. Our products also perform constant pressure control and are capable of sealing vibration devices such as accelerometers in helium or other inert gases when the devices must be accommodated in a constant internal pressure environment to maintain a uniform vibrating state.

**Fig.2 Full Automatic Vacuum Sealing Equipment NAW–1265A**

## 4. Future Endeavors

In addition to the seam welding method introduced in this article, Nippon Avionics possesses a joining technology employing heating units to implement a pulse heating method. Pulse heating adjusts the temperature through feedback control to reproduce a specified temperature profile accurately. This feature can conceivably be applied to batch sealing and die bonding in MEMS devices using filler material with a low melting point.

By refining the conventional seam welders, we offer user-friendly equipment that achieves higher yields. As a pioneer in micro-joining technology, the company supplies pulse heating units suitable for use in MEMS devices. We are confident that you will find this equipment advantageous when developing or fabricating such MEMS devices.

For a more detailed description of our products, please refer to our Web site at **http://www.avio.co.jp.**

**Note:**

With the launch of the BEANS Project in April this year, the format for this issue (No. 67) of the MICRONANO magazine has been updated to include information in the micro/nano fields distributed by both the Micromachine Center and the BEANS Laboratory, which is the association overseeing the BEANS Project. Thus, in addition to including a description of activities performed at the Micromachine Center, future issues of the magazine will also include activities and achievements by the BEANS Laboratory.

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