

New Solder Attach Technologies Streamline Assembly in Application-Specific Designs

This Tech Bulletin provides an overview of innovative new Solder Attach Technologies and describes how proven direct solder attach techniques are now being adapted for direct integration into application-specific designs from the ground up.

Topics addressed in this Tech Bulletin include:

- Overview of Solder Attach Technology Evolution
- Advantages of Application-Specific Integration
- Solder Attach Design Examples
- Keys Factors for Success

Overview of Solder Attach Technology Evolution

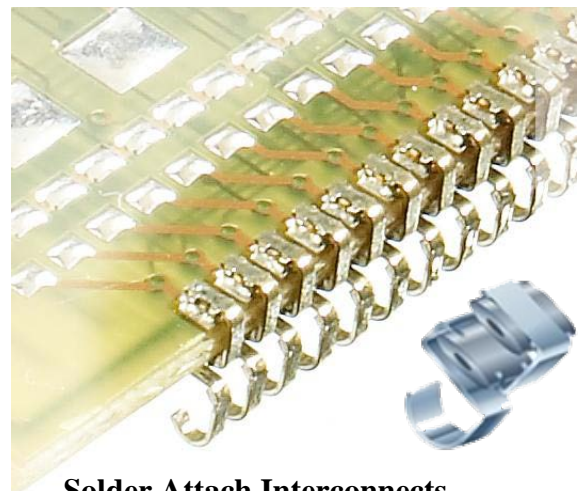
Over the course of decades, soldering continues to be the primary method of attachment and electrical connectivity for components, PCBs, lead frames, wiring, shielding, and interconnections between assemblies such as PCB-to-PCB, modules, daughter-boards, etc.

Conventional soldering processes for the above applications have generally consisted of multiple steps to bring the parts into position with each other and mechanically hold them in place, followed by applying flux and solder to the conjoined parts before conducting either wave or hand soldering steps.

Over recent years, Solder Attach technology, which consists of pre-incorporating a very precise amount of solder and flux into interconnects has greatly improved soldering results and streamlined production processes.

Solder Attach technology, pioneered by Interplex, is available in a wide range of interconnects and other products that have proven to deliver 100 percent solderability while also eliminating expensive and variable secondary processes.

As described in this Tech Bulletin, these fundamental proven Solder Attach Technologies are now also being leveraged within a widening range of custom from-the-ground-up designs to deliver 100 percent solderability and cost reduction within a widening range of application-specific product implementations.



Solder Attach Interconnects

Advantages of Application-Specific Solder Attach Integration

While standard off-the-shelf Solder Attach components can offer a variety of options for quickly and cost effectively improving solderability, there will always be unique product requirements that cannot take advantage of standardized parts. Product specific constraints such as limited space, unique form factors, special alloys, etc. may limit the usability of standard solder attach parts, but these products still need a high level of solderability and manufacturing efficiency.

Virtually any arena that requires the joining of metal parts via solder is a candidate application for integrating the solder within one of the components. For these applications, custom Solder Attach technology has moved to the forefront as the best way to accomplish overall design objectives.

Automotive Electronics

The ongoing revolution in automotive electronics is driving an explosion of new features and modular capabilities throughout the car, from under-hood to drive-train to the passenger cabin. As electrification of the modern automobile continues to unfold, designers are constantly creating new modules that must be interoperable with existing ones. Solder Attach technologies are already playing a critical role in the assembly of individual modules and stacking of sub-assemblies, as well as providing interconnects between modules.



Medical Devices

The rapid growth of portable medical devices is being driven both by new treatment and testing innovations as well as an aging population that has greater need for home-care options. Often as small as a mobile phone, these portable diagnostic devices are pushing the need for tighter integration combined with low cost and high reliability. Small custom Solder Attach solutions for direct-attach of components is a key to success in the medical device market.



Telecom & Mobile Devices

Stacking assemblies and modules have long been a mainstay throughout telecom systems and infrastructure, as well as in compact mobile devices. Solder Attach solutions have become a key enabling technology for supporting high-volume production of infrastructure and mobile devices with high-reliability with lower costs.



Display Panels

Many display panel manufacturers are looking at alternatives that use Solder Attach methods to assemble driver arrays, which are then attached to the displays with epoxy, thus achieving both high reliability and ease of assembly



Custom Applications

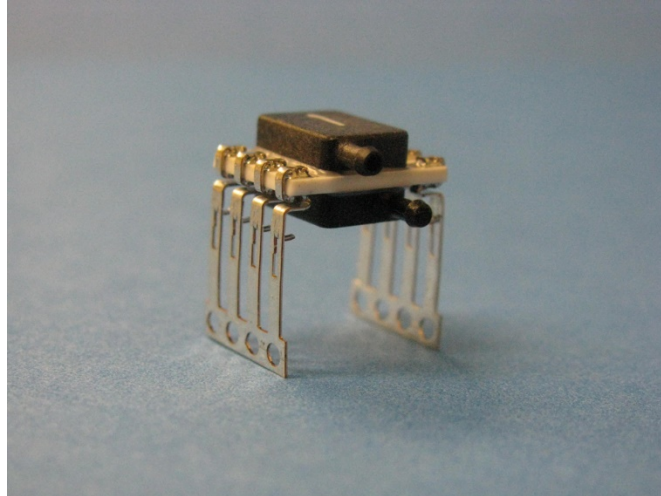
The flexibility of Solder Attach technologies, combined with custom stamping capabilities, makes the technology an ideal alternative for creating any new custom applications that require joining together of components within tight tolerances at low cost while providing high reliability.

By considering the use of Solder Attach methods early design process, engineers can greatly expand their options for achieving product design and manufacturability objectives. Solder Attach methods can be incorporated directly into the creation of virtually any application-specific components to make them “self-solderable”. This approach eliminates secondary processes and streamlines the assembly process, while also improving final product quality.

Solder Attach Design Examples

Sensors

One key area where proven Solder Attach technology is being adapted for product-specific application is in the creation of solder-ready components, such as sensors, relays, actuators, etc. Starting with a from-the-ground-up design approach, precise solder elements are incorporated right into the process of stamping and creating the underlying lead frame.



Pressure Sensor

RF Shielding

Another custom Solder Attach application is in the creation of self-soldering RF shields. For many of today's compact designs with high frequency signaling, integrating RF shields with conventional soldering has become highly problematic. Solder Attach enables designers to incorporate the solder directly into virtually any shield design, thereby enabling it to be placed and solder with standard assembly processes.



Solder Attach Custom RF Shields

Medical Devices

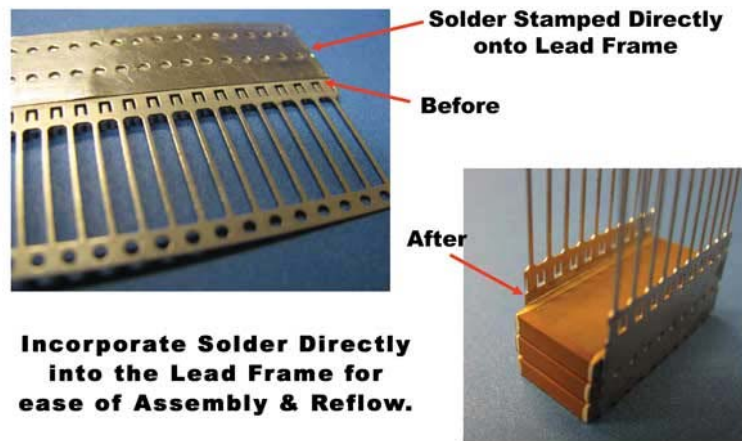
Medical devices are an important arena in which application-specific Solder Attach is fast becoming a very valuable design methodology. The tight space constraints and specialized alloys used in many medical devices make conventional soldering difficult or even impossible. For example, flex circuits used within medical devices are a prime area where Solder Attach is already making a difference by enabling solder to be precisely incorporated into metal stampings to provide 100 percent solderability to the flex circuits.



Medical Device Solder Attach Flex Circuits

Lead Frames

Another advantage of Solder Attach technology is the ability to create specialized and/or full custom designs from the ground up. The combination of custom stamping and preformed solder encapsulation techniques makes it possible to pre-position precise volumes of solder and flux virtually anywhere on the stamping. For example, the interconnect assembly shown below has the solder stamped directly into the lead frame at multiple locations. This greatly simplifies the assembly process, eliminating secondary operations and allowing the device to be assembled and reflowed in an efficient manner.



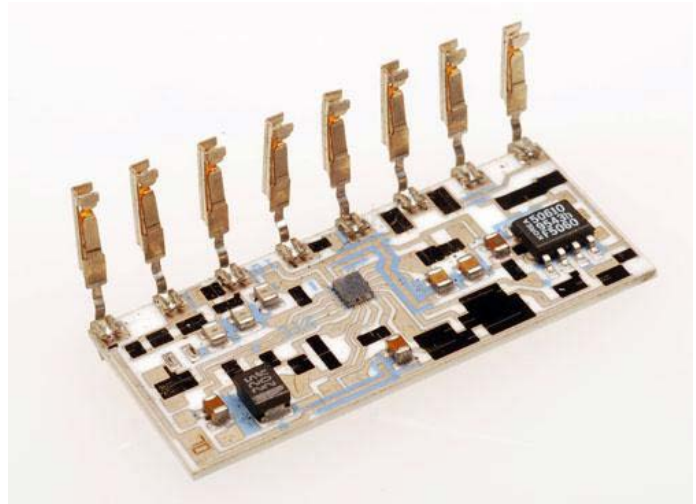
Solder Stamped Lead Frames

Custom Automotive Components

Solder Attach technology is also becoming a key methodology for creating a variety of specialized components for automotive and other industries.



Custom Automotive Sensors



Custom Automotive Solder Attach Component

Key Factors for Success

The primary keys to success with Solder Attach technology are to:

- Partner with experts that have experience with implementing Solder Attach technologies
- Start early in the design process while options for maximizing the benefits are still open
- Carefully consider choices regarding materials, alloys, solder and flux specifications
- Use a Design for Manufacturability approach to maximize yields and efficiency
- Leverage automation to assure scalability of production capacity

Summary

For an ever-growing number of new designs, application-specific Solder Attach technologies can deliver exactly the needed solutions by providing the following key benefits:

- Bring proven advantages of integrating solder into application-specific requirements
- Eliminate the need for solder paste, solder dipping or the addition of secondary flux
- Offer a high degree of production flexibility to mesh with existing methodologies
- Can include a wide range of solder types, melting points and flux choices.
- Many different standard and custom configurations to choose from and adapt
- The bottom line benefits: Simplicity, Reliability, Efficiency & Flexibility