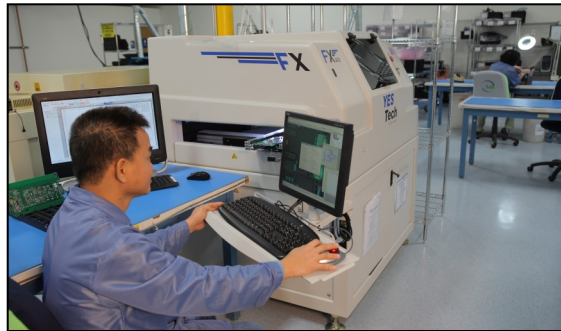


## Common Mistakes to Avoid in Product Design and Transfer: Part I

SAI's TransferAssist team works with customers to ensure their projects are ready for outsourcing. The process includes a review of fabrication and Gerber files. Afterwards, the team makes recommendations for improving the design and/or documentation to better accommodate the requirements of a volume manufacturing process optimized for increased throughput with minimal handling.



The team at SAI focuses on optimizing manufacturability.

This quarter, we look at some of the most common manufacturability mistakes we've found. Addressing these issues prior to outsourcing will save time in the process. In the design for manufacturability (DFM) realm, seven common mistakes stand out:

- **Panelization issues:** this is an area where working with your contract manufacturer can be critical, as many

contract manufacturers have specific guidelines on preferred printed circuit board (PCB) sizing and orientation for fast setups and maximum throughput. Additionally, the panelization strategy should be reviewed to determine if it is the most efficient layout in terms of minimizing wasted FR4.

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### About SAI

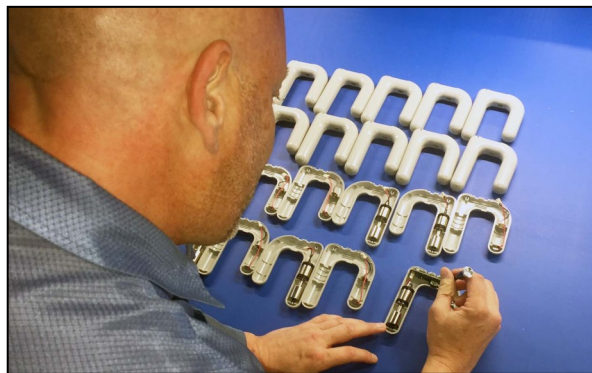
Founded in 1993, Spectrum Assembly, Inc. is a one-stop source for all your contract manufacturing needs. We combine an expert team, flexible automation and a world class supply base to provide responsive, on-time delivery for even the most complex projects.

Our manufacturing operations are housed in twostate-of-the-art facilities totaling 65,000 sq. ft. in Carlsbad, CA. We are small enough to provide a highly personalized approach, yet large enough to address your requirements from new product introduction through end-of-life.

### SAI in Action

## Helping Spinal Singularity Improve Quality of Life

Spinal Singularity is a seed stage, venture-backed medical device company in San Clemente, CA that designs, develops, manufactures and distributes medical devices to exponentially improve the quality of life for people with spinal injury. Once approved/cleared by appropriate regulatory agencies, its Connected Catheter™ will be the first fully internal, extended-use catheter system for adult males



An operator assembles a wireless controller unit.

with chronic Lower Urinary Tract Dysfunction, lasting up to 29 days in the body.

Spectrum Assembly, Inc. was chosen to build product required for the company's First-in-Man Clinical evaluations which commenced in Q1 2018.

"I had used SAI previously at an-

*(Continued on page 2)*

## MDM West a Success, DMEMS Show Scheduled in May

Spectrum Assembly, Inc. exhibited at MDM West 2018 in Anaheim, CA in February.



“The attendance and booth traffic were better than we have seen in prior years. There were several projects that look like a good fit that we are pursuing. Medical business has always been a strong sector in this region and a large segment of SAI’s business. From what we’ve seen

at the show, it will likely continue to help drive our growth,” said Alexandra Topp, Sales and Marketing Manager.



Spectrum Assembly, Inc. will exhibit at the Del Mar Electronics & Design Show at the Del Mar Fairgrounds in San Diego on May 2-3 in Booth #302-304.

## SAI in Action

*(Continued from page 1)*

other company and had a wonderful experience. We needed a contract manufacturer specializing in electronic medical devices with robust production, process and quality controls, and the ability to help us improve our product’s manufacturability,” said Stephanie Rallis, Spinal Singularity’s Director, Quality.

The Connected Catheter™ is composed of a disposable catheter, a one-time use device to assist with insertion and removal, and a wireless controller. SAI is building the wireless controller’s two printed circuit board assemblies (PCBAs) and assembling the finished wireless controller device.

The team at SAI had a number of suggestions for improving device manufacturability including recommending a panelization strategy that enabled the PCBAs to be routed at the end of the assembly process to minimize stress on solder joints. They also recommended moving components further away from the edge of the PCBA to improve solder joint integrity. Since the PCBA has mixed through-hole and SMT technology, they also recommended a change to two different solder pastes. At the final assembly level, the team suggested that heat shrink tubing be added to the wiring to strengthen the solder joint.

“While our team is great at designing and developing innovative medical devices, partnering with an electronic medical device manufacturing expert has contributed to us improving manufacturability of our finished device. SAI’s recommenda-

tions are also helping us maintain superior quality and improve reliability,” added Stephanie.

SAI’s team also solved an internal manufacturing issue at Spinal Singularity.

“Our team was using one crimp tool for all crimping in our internal assembly process. As experts in cable assembly, the team at SAI recognized that each component had a specific crimp tool requirement. This improved the reliability of our crimping process,” said Stephanie.

“We see sharing our manufacturing expertise as a key part of the value we deliver. It is a win-win situation because the improvement that this type of collaboration drives typically grows business at both our companies,” said Alexandra Topp, SAI’s Sales & Marketing Manager.

“We had a PCB component in which the lead-times at our supplier stretched out unexpectedly. When the components arrived, SAI cut its normal manufacturing cycle time to ensure that our products were kept on schedule without compromising the quality of the devices. Having a collaborative manufacturing partner that helps us swiftly and effectively address challenges that arise has and will continue to be an asset to our team,” said Stephanie.



## DFM Mistakes

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- **Connector placement:** Edge mounts must be kept on PCBs through processing. Depaneling tools cannot be used if a right angle connector is placed on a side of the PCB containing an edge mount. The only option for that type of layout is to depanel using manual force, which can negatively impact solder joint integrity. Consequently, it is important to consider panelization strategy in PCB layout when determining connector placement.
- **Documentation:** Gerber files are often transferred as single-up designs instead of as a panelized design. This adds additional work during project transfer.
- **Stencil paste file errors:** Optimum paste deposition often requires an aperture design that varies from the component footprint. Many Gerber stencil paste files are prepared 1:1, which doesn't account for the impact of component mass in paste deposited via the screen aperture. Component manufacturers list recommended specifications and many contract manufacturers have an aperture design preference for specific types of components. For example, SAI has found that LED diodes are best placed when a triangular shaped solder paste aperture is used. Its team reviews the parts with critical paste deposition requirements prior to ordering the screen.
- **Fiducials:** Fiducials are marks placed on the PCB to enable machine vision systems to understand the position of the component placement head relative to the PCB. Most PCB layout teams are good at adding fiducials to the PCB layout. However, some FR4 masking colors can make fiducials hard to read or invisible because the color of the mask is the same or lighter contrast than the fiducials. Machine algorithms can be adjusted to change fiducial brightness in most cases. Another option is to avoid masking over the fiducial. The most difficult color to compensate for is yellow. In this case, the "no mask" area should have a wide clearance for fiducials.
- **PCB finish mismatch:** In some cases, a designer will specify a HASL finish for use with lead-free solder. HASL finishes do not have a flat coplanarity and in a lead-free reflow process can create coplanarity issues. An ENIG finish is generally preferred for use with lead-free solder. The team at SAI most often sees this issue when working with consigned materials.
- **Failure to utilize recommended pad layout size:** Misalignment and other solder joint integrity issues can occur if the correct .

In next quarter's newsletter issue, we will look at some of the most common design for assembly (DFA) mistakes found.