

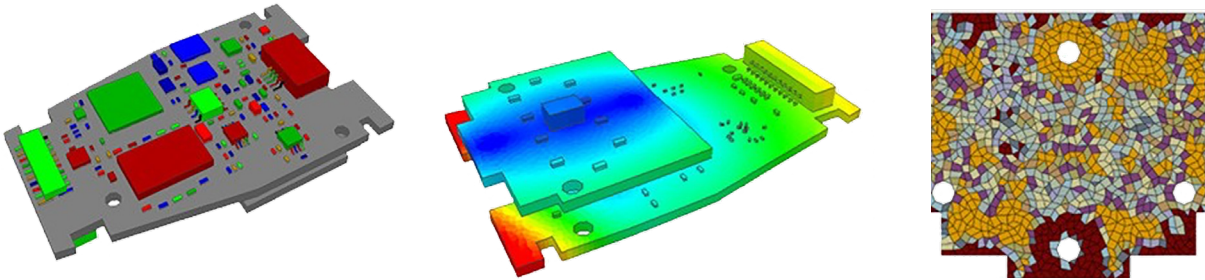
# Simulation and Modeling for Medical Device Manufacturing

## Failures Identified

A global medical device manufacturer was experiencing in-service failures of an electronic device and struggling to define the root cause. Product testing did not show the same failure modes as the in-service component. The Ansys Reliability Engineering Services team combined decades of electronics reliability experience with simulation and modeling tools to assess failure risks under operational thermal, shock and vibration loading.

### / Approach

Attempting to simulate every possible use case at the highest fidelity can be costly and time-intensive. Ansys experts in electronics reliability worked with the device manufacturer to understand the failures observed, the device design and the use environment prior to selecting simulation use cases. Focusing on specific shock, vibration and thermal use cases was critical to rapid identification of the failure mechanism.



REFDES	PACKAGE	PART TYPE	SIDE	MAX DISP	MAX STRAIN
U14	BGA	IC	BOT	2.7E-1	7.8E-4
J2	SON	PLUG CO...	TOP	1.9E-2	2.3E-3
UB	STM-UFPGA176+	IC	BOT	3.0E-1	5.2E-4
J3	SOIC	PLUG CO...	BOT	2.0E-2	4.8E-4
U13	WDFN-8	IC	BOT	9.2E-2	4.8E-4

*This simplified model geometry and optimized meshing approach focused on the critical design features that could impact reliability under the operational loads specific to the device – minimizing simulation setup and run times and design cycle time*

### / Results

The resulting analysis identified components that were exceeding their design limits under normal operating conditions, leading to the device shutdown failures observed in-service. In addition to identifying the failure mechanism, the work demonstrated the value of robust simulation and modeling as an integral part of the design process to identify and mitigate potential failures before they show up in the final product.

### / Benefits

- The Ansys team was able to identify at-risk components and potential weak points in the housing in worst-case conditions.
- Using these results, design engineers at the device manufacturer were able to eliminate areas of overdesign (reducing cost), shore up select areas of the design to mitigate the risk of failure and optimize material choices, tolerances and assembly strategy — all without further testing.

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