



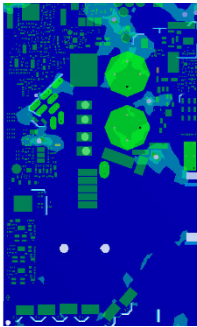
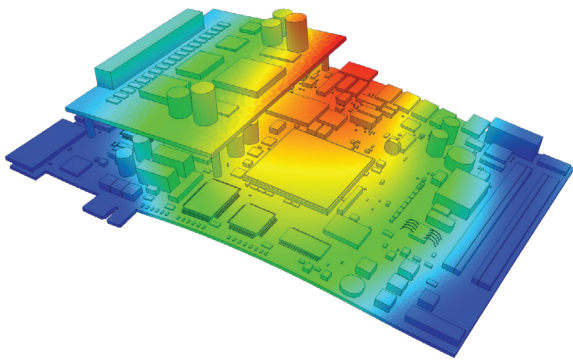
ANSYS® Sherlock + Danfoss

“With ANSYS Sherlock accelerating the process, Danfoss is spinning up a new set of solutions that can help make the world a more efficient consumer of the electricity it relies on.”

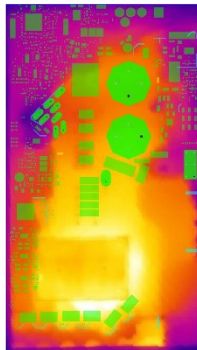
Amol R. Chopade

Lead Reliability Engineer

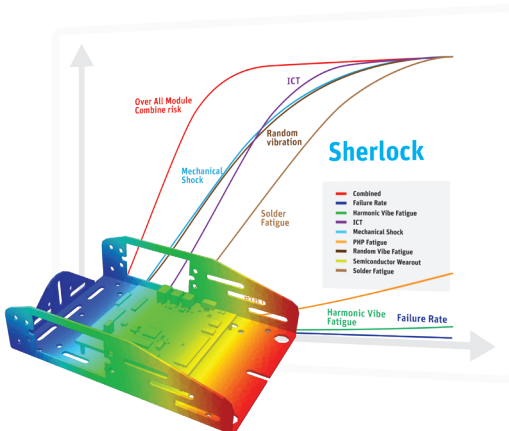
Danfoss Drives A/S, Graasten, Denmark



ANSYS Sherlock displays strain distribution on PCBA from system simulation and solder joint or component cracking risk analysis. The components in green reveal there is no risk, a result achieved after several design iterations.



Temperature distribution due to power losses on the component and in the PCB tracks used for solder joint fatigue life estimation. The components in green show no risk of solder joint fatigue; those in yellow show marginal risk. Several design iterations were performed to achieve acceptable lifetime results.



Introduction

Danfoss sought continued innovation of their AC drives with the goal of reducing energy waste. Considering the thousands of variants of utilization for AC drives, Danfoss wished to improve the efficiency of their AC drives without sacrificing the abundance of deployment methods. This required ensuring that the same AC drive design that regulates motor speed for a radar array in the Arctic Circle without failing must also do so for a hard disk drive in an office in California without wasting energy.

Challenges

In exploring innovations for their AC drives, Danfoss goes through the painstaking process of design-build-test-fix, often four or more times, with each iteration consuming 6 to 8 months of work. As a result, the final design for a new drive could stretch time to market to over 2 years.

Technology Used

ANSYS Sherlock

Engineering Solution

In 2014, Danfoss's team of reliability engineers turned to ANSYS Sherlock Automated Design Analysis to evaluate the reliability and robustness of their new AC drive designs. Sherlock provides the engineers with a map of the components that shows how long each part is likely to last. It takes only a moment to load a scenario, and most simulations take only 3-4 hours to complete. When testing physical prototypes, it might have taken Danfoss engineers months or years to set up and run some of these tests.

Benefits

- Through the predictive powers of Sherlock, Danfoss A/S is now bringing new drives to market in one-quarter of the time previously required, as their engineers no longer need to wait for physical prototypes to test for reliability. Danfoss reliability engineers convert ECAD files into FEA models which are automatically prepared for simulation within minutes.
- Danfoss also found that their engineers are conducting more failure tests than they used to, but doing so through Sherlock simulations rather than physical testing, ultimately reducing test costs.
- Overall, reports indicate that both product reliability and customer satisfaction have improved.

Company Description

Danfoss A/S is the world's second largest manufacturer of adjustable speed drives (AC drives), with customers from all over the globe and across multiple industries. Customers utilize Danfoss A/S' AC drives to control electrical motor speeds in a wide range of applications, from dishwashers and luggage carousels to turbines and computers.

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